

REMARKS

The Examiner's reconsideration and withdrawal of the objections to claims 1, 11, 13, 20, and 27-29 is noted with appreciation.

Rejections Under 35 U.S.C. 103

Claims 1, 9, 20-23, 25-27, and 31 stand rejected under 35 U.S.C. 103(a) over Li (U.S. Patent No. 6,385,371) in view of Wong (U.S. Patent No. 5,408,556). Claims 5 and 14 stand rejected under 35 U.S.C. 103(a) as being obvious over Wong in view of Russell (U.S. Patent No. 4,932,747). Claims 2-4, 8, 10-13, 17, 19, 28 and 30 stand rejected under 35 U.S.C. 103 (a) over Wong. Claims 7 and 16 stand rejected under 35 U.S.C. 103(a) as being obvious over Wong in view of Berkey (U.S. Patent No. 4,915,467). Claims 24 stands rejected under 35 U.S.C. 103(a) as being obvious over Li in view of Wong and Berkey. The Li reference is newly applied, and the remaining references were previously applied. The Applicants respectfully traverse the rejections, for the reasons set forth below.

Li and Wong Rejection of Claims 1, 9, 20-23, 25-27, and 31

Claim 1

Independent Claim 1 of the present application recites, in part, "a plurality of optical fibers ... fused together ... to form a fused section ... tapered to form a tapered region" and "a facet ... formed by cutting and polishing or by cleaving said tapered region ...; said facet having a cross section other than approximately equal to the cross section of an individual single-mode fiber." The Examiner previously rejected claim 1 in view of Wong, but now looks to a combination of Li and Wong in making the rejection. It is respectfully put forth that the Examiner's reliance upon this combination is not only misplaced, but is simply not understood.

It is important to understand that which is explicitly recited in independent claim 1. Claim 1 requires "a **plurality of optical fibers ... fused together** along a second

end of each optical fiber proximate the first end of each optical fiber to form a **fused section** having a fiber axis, the **fused section ... being tapered** to form a **tapered region ...**; and a **facet ... formed by cutting and polishing or by cleaving said tapered region** in a direction perpendicular to said fiber axis; **said facet having a cross section other than approximately equal to the cross section of an individual single-mode fiber.**" In other words, claim 1 requires fused fiber bundle formed into a tapered region, and a facet formed in that tapered region. The applied art, as will be understood from the discussion below, in no way teaches or suggests that which is claimed.

Li is directed to an optical coupling for joining one single fiber light guide to multiple single fiber light guides for **illumination** purposes. Light guides are used in architectural lighting, remote illuminations, and decorative lighting (see, for example, column 1, lines 1-15, of Li). As an example of a practical use of Li's optical coupling Li discloses the use of multiple types of light inputs to achieve a desirable light output for illumination: "The lamps used as the inputs [to the optical coupling] ... may be different, and different types of lamps may be combined to achieve desired output characteristics. For example, combining a mercury lamp and a sodium lamp can give an **output that is closer to daylight** than the bluish mercury lamp or the yellowish sodium lamp" (column 8, lines 31-36).

Thus, Li is not even in the same field of invention as the present application, or even Wong. Li is directed to the field of illumination, while the instant application is directed "to coupling **laser light** in fibers" (US2004/0165827A1 paragraph [0005]). Wong is directed to "couplers for optical fibers used in **communication** cables" (Wong, column 1, lines 6-7). More particularly, and as discussed in the Amendment and response filed May 7, 2007, Wong relates to a 1 x N splitter for single-mode optical fiber that is made with an individual single-mode optical fiber and a bundle of non-symmetrical arranged single-mode fibers that are fused together along a portion of their lengths.

In view of the disparate fields, not surprisingly Li does not disclose that which the Examiner asserts. The Examiner argues that Li discloses multiple optical fibers which

are somehow bundled together (the Examiner acknowledges that Li does not disclose the required fusing, which will be addressed below) to form a tapered region having a facet. In particular, and as can best be understood, the Examiner argues that details 24, 28, 32 and 34 of Figure 3 show a plurality of optical fibers (detail 32, according to the Examiner) that are tapered (detail 28, according to the Examiner) and have a facet (detail 24, according to the Examiner).

It is respectfully submitted that the Examiner's analysis of Li is mistaken. What Li shows and describes is an optical coupling (Figure 3, detail 20) that comprises a first coupler (Figure 3, detail 22) and a second coupler (Figure 3, detail 30). The first coupler 22 includes a first transmitting section 24 that comprises a section of a **single** fiber light guide that receives light from a single light source or from a single fiber input" (column 3, lines 56-59). Clearly this portion of Li relied upon by the Examiner does not teach or otherwise suggest a **plurality of optical fibers**. Rather, what is disclosed is **single** fiber light guide.

Li continues in describing his optical coupling: "The first coupler 22 has a first interface surface 26 ... A first transition section 28 connects the first transmitting section 24 to the first interface surface 26" (column 4, lines 8-22). As should be understood from the discussion above, transition section 28 is not a **plurality of optical fibers** that are **tapered**, nor the first transmitting section 24 a **facet** formed in a **tapered region** of a **plurality of optical fibers**.

Regarding the second coupler 30, Li continues: The "second coupler 30 comprises two or more individual single fiber light guides 32 arranged in mutual juxtaposition of one another. Each of the individual fiber light guides 32 includes a second transmitting section 34, a second interface surface 36 ... and a second transition section 38 connecting the second transmitting section 34 and the second interface surface 36" (column 4, lines 28-37). As should be understood, the second coupler 30 is not a plurality of optical fibers **fused together** to form a **tapered region**. At best, a plurality of light guides is disclosed. Further, and clearly, a **facet** formed in a **tapered region** of a **plurality of optical fibers** is neither taught nor suggested by the second coupler 30. Accordingly, the required "plurality of optical fibers ... fused

together ... to form a fused section ... being tapered to form a tapered region" and "a facet" in the "tapered region" are neither taught nor suggested by the Li.

As noted above, claim also 1 requires that the facet formed in the tapered region of the multiple optical fibers have "a cross section other than approximately equal to the cross section of an individual single-mode fiber." Since Li fails to teach or suggest the required facet (or even the required tapered portion), it necessarily fails to teach or suggest a facet "having a cross section other than approximately equal to the cross section of an individual single-mode fiber."

As discussed in the Amendment and Response filed May 7, 2007 (the discussions/arguments of which are reasserted here in their entirety, though for the sake of brevity are not reproduced herein), Wong does not teach or suggest, and cannot be modified to have, a facet having a cross section other than approximately equal to the cross section of an individual single-mode fiber. The Examiner implicitly acknowledges this, as the Examiner no longer exclusively relies upon Wong in rejecting the claim in view of the prior amendment adding the language directed to the cross section, but instead looks to Li for this feature.

Introduced above, the Examiner explicitly acknowledges that Li fails to teach or suggest either i) forming a facet by cutting and polishing or by cleaving, or ii) fusing a plurality of optical fibers along a section of each optical fiber. To cure the Examiner-acknowledged defects of Li the Examiner looks to Wong. The Examiner argues that Wong discloses a cleaved facet formed in a tapered bundle of multiple optical fibers. The Examiner further argues that "one of ordinary skill in the art would have found it obvious to use a fusing method to form the tapered section of Li's apparatus, and further states the fusing method allows for the even distribution of optical energy among all fibers within the bundle." It is respectfully noted that since Li fails to even teach or suggest the required facet, any fusing, cutting and polishing and/or cleaving that may be taught by Wong does not and cannot yield the invention recited in claim 1, even if Wong could be combined with Li.

Still further, as will be understood by one of ordinary skill in the field of optics, not only does the Li and Wong combination not cure the defects noted above, but the

proposed combination simply cannot be made because Li and Wong are in different fields. As discussed above, the light guides of Li are for carrying visible light for illumination purposes, while the optical fibers of Wong are for carrying communication signals. What the result would be if the optical guides of Li were somehow manipulated as the optical fiber of Wong are can only be guessed. Correspondingly, what the result would be if the optical fiber of Wong were somehow combined with the light guides of Li can only be guessed.

Accordingly, independent claim 1 is new and non-obvious in view of Li and Wong, whether taken individually or in combination. In view of the above, it is courteously requested that the Examiner reconsider and withdraw the rejection of independent claim 1.

Claim 9

Notwithstanding that at least in view of its dependency on claim 1, claim 9 is patentable over Li and Wong, as claim 9 is otherwise new and unobvious. Claim 9 recites that the "plurality of optical fibers disposed in the fused section are uniformly stretched to provide a desired amount of optical coupling between each optical fiber." Regarding claim 9, the Examiner argues that "even signal distribution among the plurality of optical fibers 32 is a stated goal of Li", and thus claim 9 is disclosed by Li. It is respectfully noted that the relied upon portion of Li, column 2, lines 6-11, does not recite that which the Examiner asserts. Rather, Li states that a need exists for a coupling for transmitting light (not a signal) between one single fiber light guide and multiple single fiber light guides "that avoids losses due to interfiber gaps and also avoids fiber to fiber output power variations" (column 2, lines 6-11). Li, again, does not disclose a fused fiber bundle, let alone the recited uniform stretching of claim 9. Thus, for at least this reason alone, claim 9 is patentable.

Claims 20 and 27

Like claim 1, independent claims 20 and 27 each recite "a plurality of ... optical fibers ... fused together ... to form a fused section ... tapered to form a tapered region"

and "a facet ... formed by cutting and polishing or by cleaving said tapered region ...; said facet having a cross section other than approximately equal to the cross section of an individual single-mode fiber." Accordingly, the Applicants respectfully submit that the arguments used above to show that claim 1 is both novel and unobvious in view of the applied art can also be used to show that claims 20 and 27 are also novel and unobvious over the applied art, whether taken individually or in combination. As such, the Examiner is courteously requested to reconsider and withdraw the rejection of claims 20 and 27.

Claims 21-25, 26, and 31

Claims 21-23, 25, and 26 depend from independent claim 20, and claim 31 depends from independent claim 27. Claim 24 depends indirectly from independent claim 20. The Applicant's respectfully submit that at least in view of their dependency on independent claim 20 or 31 these claims are patentable over Li and Wong, whether taken individually or in combination. Applicants respectfully ask that the Examiner reconsider and withdraw the rejection of these claims.

Wong and Russel Rejection of Claims 5 and 14

Claim 14

The Examiner maintains the argument that Russel discloses a combiner having a very similar structure to that of Wong, where an optical input may be provided to the plurality of unfused fibers and combined into a single output at the facet, and further maintains that it would have been obvious to use the splitter of Wong as a combiner, as is described by Russel, as doing so will increase the overall usability and functionality of the device, allowing the apparatus of Wong to bi-directionally function not only as a multiplexer, but also as a demultiplexer. The Applicants again respectfully disagree.

Independent claim 14 recites, in part, "emitting the optical inputs as a single combined optical output at the facet into free space." As Applicants previously argued in the Amendment and Response filed May 7, 2007, and reassert here, Wong discloses

unambiguously that an essential feature of its invention is that an individual single-mode optical fiber has a junction end juxtaposed, through a focusing lens/junction element, to the end of the bundle of fiber. The skilled reader readily understands that the individual single-mode fiber and the focusing lens/junction element physically prevent emitting light from the facet into free space.

Since the individual single-mode optical fiber and the focusing lens/junction element juxtaposed to the end of the bundle of fibers are essential features of Wong, it would not be obvious to cancel the single-mode optical fiber and focusing lens/junction element from Wong, whereby it is not obvious to modify Wong so as to be able to emit a single combined optical output at the facet into free space. It follows that claim 14, reciting "*emitting the optical inputs as a single combined optical output at the facet into free space*", is new and non obvious in view of the applied art.

Wong recites in each of its independent claims that the bundle of fibers is juxtaposed/joined to an individual single-mode optical fiber through a focusing lens/junction element. The Applicants again note that by doing so Wong unambiguously discloses that the feature of the bundle being juxtaposed, through a focusing lens/junction element, to the individual single-mode fiber is an essential feature of its device. As detailed in the Amendment and response dated May 7, 2007, canceling an essential feature from Wong would render Wong unsatisfactory for its intended purpose. It follows that it cannot be argued that there is any suggestion in the prior art to modify Wong by canceling the essential feature of the individual single-mode fiber and focusing lens/junction element juxtaposed to the bundle.

The Examiner responds to Applicants' previous arguments by stating "Figure 9 of Wong shows the tapered fiber bundle where the facet is unattached to another fiber, and therefore capable of transmitting/receiving an optical signal from free space at the facet." It is respectfully brought to the Examiner's attention that Figure 9 shows but one step, step 4, in the construction of Wong's splitter, not a working device, and certainly not an embodiment of his invention combinable with any other art (Wong, column 3, lines 31-32). Wong does not teach or suggest that the partially constructed splitter shown in Figure 4 can, or could, be usable in any way or for any purpose. The

Examiner is, at best, using impermissible hindsight in making the rejection, and at best is putting forth unsubstantiated conjecture. It is courteously requested that the Examiner reconsider and withdraw the rejection of claim 14.

Claim 5

The Applicants respectfully submit that the arguments used above to show that independent claim 14, which recites "*emitting the optical inputs as a single combined optical output at the facet into free space*", is new and non obvious, can also be used to show that claim 5, which recites an apparatus "*wherein the plurality of optical inputs are emitted into free space at the facet as a single combined optical output*", is non obvious over Wong and Russell. Applicants ask that the Examiner reconsider and withdraw the rejection of independent claim 5.

Wong Rejection of Claims 2-4, 8, 10-13, 17, 19, 28 and 30

Claim 11

Independent claim 11 recites, in part, ""illuminating the facet with a single optical input traveling in free space". The Examiner acknowledges that Wong does not disclose the facet receiving an optical signal via free space, but instead teaches an input being received from another optical fiber. The Examiner again argues "being that the apparatus is capable of receiving an optical input, it would have been obvious to one of ordinary skill in the art to use any optical source in conjunction with the apparatus, including an optical signal propagating in free space." The Applicants respectfully disagree.

As Applicants previously noted, Wong recites in each of its independent claims (1, 4 and 6) that the bundle of fibers is juxtaposed/joined to an individual single-mode optical fiber through a focusing lens/junction element. The Applicants again note that by doing so Wong unambiguously discloses that the feature of the bundle being juxtaposed, through a focusing lens/junction element, to the individual single-mode fiber is an essential feature of its device. As detailed in the Amendment and response dated

May 7, 2007, canceling an essential feature from Wong would render Wong unsatisfactory for its intended purpose. It follows that it cannot be argued that there is any suggestion in the prior art to modify Wong by canceling the essential feature of the individual single-mode fiber and focusing lens/junction element juxtaposed to the bundle.

The skilled reader readily understands that the individual single-mode fiber and the focusing lens/junction element physically prevent from illuminating the facet of the bundle with a single optical input traveling in free space. It follows that illuminating the facet of the bundle with a single optical input traveling in free space is non obvious over Wong, at least because it would require a non obvious modification of Wong.

The Examiner responds to Applicants' previous arguments by referencing Figure 9 as done so in responding to Applicants' previous arguments regarding claims 5 and 14. We respectfully reiterate that stated above, namely, that the referenced Figure 9 shows but one step, step 4, in the construction of Wong's splitter (Wong, column 3, lines 31-32). Wong does not teach or suggest that the partially constructed splitter shown in Figure 4 can, or could, be usable in any way. The Examiner is, at best, using impermissible hindsight in making this rejection, and at best is putting forth pure conjecture.

In view of the above, Applicants maintain that claim 11 is new and non obvious over the applied art and courteously ask that the Examiner reconsider and withdraw the rejection thereof.

Claim 28

Independent claim 28 recites, at least in part, *"the facet is adapted to receive a single optical input traveling in free space, the fibers having each a core and a cladding and a mode shape, the sum of the mode shapes of the fibers being calculated, and the core/cladding size ratio and stretch being selected, to maximize coupling of the free space beam into the core ensemble"*.

As previously discussed, Wong recites in each of its independent claims (1, 4 and 6) that the bundle of fibers is juxtaposed/joined to the individual single-mode optical

fiber through a focusing lens/junction element. Applicants reiterate that by doing so Wong unambiguously discloses that the feature of the bundle being juxtaposed, through a focusing lens/junction element, to the individual single-mode fiber is an essential feature of Wong's invention.

As previously detailed, the Applicants respectfully submit that a device modified so that it does not comprise all the essential features of Wong would not be within the scope of Wong's invention and would be unsatisfactory for the intended purpose of the invention of Wong. It follows that it cannot be argued that there is any suggestion in the prior art to modify Wong by canceling Wong's essential feature of the individual single-mode fiber and focusing lens/junction element being juxtaposed to the bundle.

On another hand, the skilled reader readily understands that the individual single-mode fiber and the focusing lens/junction element physically prevent from illuminating the facet of the bundle with a single optical input traveling in free space. It follows that illuminating the facet of the bundle with a single optical input traveling in free space is non obvious over Wong, at least because it would require a non obvious modification of the invention of Wong. It also follows that it is also not obvious to modify the device of Wong to maximize coupling of a free space beam with the bundle; and in particular by calculating the sum of the mode shapes of the fibers and selecting the core/cladding size ratio and stretch to maximize coupling of the free space beam into the core ensemble.

As can best be understood, the Examiner seems to have ignored certain features recited in claim 28. Namely, the requirement that "the sum of the mode shapes of the fibers being calculated, and the core/cladding size ration and stretch being selected, to maximize coupling of the free space beam into the core ensemble" has not been given its full due. The Examiner states "claim 28 only requires the device to be formed such that the coupling of the free space beam is maximized." For this, the Examiner relies upon *In Re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ 2d 1429, 1431-32 (Fed. Cir. 1997). It is respectfully asserted that the Examiner has misapplied *Schreiber*. *Schreiber* teaches that an apparatus must be distinguished from the prior art in terms of structure rather than function. The ignored language is not functional language, but

rather language that clearly and specifically defines structure of the claimed fiber optic apparatus. Accordingly, the neglected portion of claim 28 should clearly have been considered. The Examiner's attention is directed to *Hewlett-Packard Co. v. Bausch & Lomb Inc.* in which the court stated "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). Clearly, the ignored language is directed to what the claimed fiber optic apparatus is, not what the claimed fiber optic apparatus does. At a minimum, the rejection of claim 28 is improper based upon the Examiner's failure to consider language which defines structure.

The Examiner responds to the Applicant's prior arguments by reference to Figure 9. We again respectfully reiterate that stated above regarding the Examiner's reliance upon Figure 9. Figure 9 shows but one step, step 4, in the construction of Wong's splitter (Wong, column 3, lines 31-32). Wong does not teach or suggest that the partially constructed splitter shown in Figure 4 can, or could, be usable in any way, or for any purpose. The Examiner is, at best, using impermissible hindsight in making this rejection, and at best is putting forth unsubstantiated conjecture.

In view of the above, it follows that claim 28 is new and non obvious over Wong. Accordingly, it is respectfully requested that the Examiner reconsider and withdraw the rejection of independent claim 28.

Claims 12, 13, 16, 17 and 19

Claims 12, 13, 16, 17 and 19 depend directly or indirectly on claim 11. The Applicants respectfully submit that at least in view of their dependency on claim 11, claims 12, 13, 17 and 19 are patentable over the cited prior art.

Claims 2-4, 7, 8, 10 and 30

Claims 2-4, 7, 8, 10 and 30 depend directly or indirectly on claim 28. The Applicants respectfully submit that at least in view of their dependency on claim 28, claims 2-4, 7, 8, 10 and 30 are patentable over the cited prior art.

* * *

In view of the above, Applicants submit that the application is now in condition for allowance and respectfully urge the Examiner to pass this case to issue.

The Commissioner is authorized to charge any additional fees that may be required or credit overpayment to deposit account no. 12-0415. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 12-0415.

Respectfully submitted,

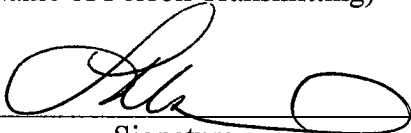
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